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A SPIRAL OSTEOTOME FOR OPENING THE SKULL IN BRAIN-SURGERY.

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DURING the past year the surgical engine, with its appliances, has been so greatly improved that its general use for bone-operations can no longer be questioned. The hand-piece has been enlarged, enabling the various cutting instruments to be more firmly placed, while room has been obtained for the attachment of guards of suitable kinds. The instrument can also be easily and quickly taken apart, cleaned, and made thoroughly aseptic. A velocity of from 10,000 to 12,000 revolutions a minute can be obtained, with great steadiness and regularity of speed.

One of the new appliances—a circular saw, having an adjustable guard for opening the brain-case—was used successfully lately in an operation performed at the Orthopedic Hospital by Professor W. W. Keen, for the removal of the Gasserian ganglion. The advantage gained by the use of this saw was the rapidity with which it cut, yet perfection seemed lacking, in that the mallet and chisel had to be called into requisition for supplementary work. This case, as well as a series of carefully conducted experiments upon the cadaver, shows, however, that all danger of wounding the dura is not absolutely eliminated even by the use of the guard which is attached to the mandrel of the saw to prevent the penetration of its cutting-edge beyond a previously determined depth. The danger exists in the fact that

brain-cases vary in thickness, and even the individual skull is thicker in some parts than others, thus making it impossible to accurately fix the guard.

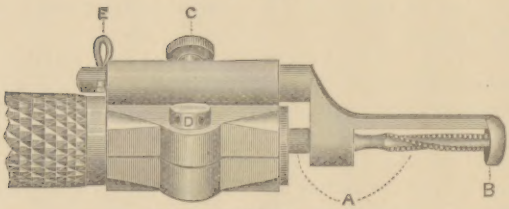
A number of experiments have been carried out by the writer with the hope of overcoming the danger of wounding the membranes either with the saw or in the final cutting of the bone with the chisel and mallet, the latter adding materially to the shock, and not being free from the possibility of puncturing the brain.

After many trials of variously constructed burrs, the following arrangement was hit upon, which seems to completely fulfil the requirements. The cutting portion of this "spiral osteotome" (Fig. 1) is one-half inch

FIG. 1.[1]

Twice the size of cutting-tool.

FIG. 2.[1]



Full size of instrument.

in length, one-eighth inch in diameter, and tapers slightly from base to point. By three spiral grooves, each having a turn of one hundred and twenty degrees through the half-inch from base to point of the cutting end, it is divided into three blades, giving it an appear-

[1] For the privilege of using these illustrations we are indebted to the publishers of Dental Cosmos.

ance somewhat similar to a twist-drill. The effectiveness of these blades is enormously increased by a spiral screw, forty-four threads to the inch, cut around the blades of the instrument. This device necessarily adds twenty-two teeth to the edge of each cutting blade. The individual teeth are so arranged with reference to one another that the cut made by one tooth is overlapped by that of the one next following, while the spiral arrangement of these teeth, in connection with the three spiral grooves, makes the burr perfectly self-cleaning, the débris being rapidly thrown out backward by the revolution of the instrument. The point of the burr when in use is guarded by a rounded, button-like attachment, connected with the nose of the hand-piece by means of a shank and collar, as shown in Fig. 2 at A. The free end of the burr is dowelled into a seat in the guard A, in which it revolves, which steadies the whole arrangement when in use, gives an added rigidity to the burr-shank, and holds the burr and guard in permanent relationship to each other.

It will be seen that the principle involved in the instrument described is simply that of a saw arranged to cut in a line with the axis of the shaft of the burr, and not at right angles to it, as in the circular saw. Such an arrangement allows of cutting in any direction and upon curved lines. This feature is especially valuable in resections of the brain-case, inasmuch as fenestra of any desired shape or size may be speedily made.

In operating for the removal of a portion of the brain-case with the spiral burr, after division of the soft tissues by the scalpel, a small opening is first made with a trephine mounted in the engine handpiece; this trephine has a diameter of five-sixteenths of an inch, and is passed completely through both tables of the skull, and the button of bone removed. There is no danger of injuring the dura with the trephine if it be carefully used. The opening thus made affords a means of entrance for the cutting burr, which, with its protecting guard, is next

inserted in the opening, and the section made along the lines previously determined, by running the engine at high speed and forcing the bit laterally in the direction desired.

The button-like guard at the point of the burr absolutely prevents injury to the dura, which is pressed or dissected away by it from its attachment in the line of the cut as the instrument progresses.

The detailed description here given is of an instrument that I have called the spiral osteotome, which was designed for the special operation under consideration. Other instruments, simple modifications of this, would, of course, be needed, and could be easily made for other operations upon bone. A longer instrument, with or without a guard, could be used for resection of the long bones, of the femur, for example, in any part of its length, even at the head, while in the acetabulum. To remove diseased or nodulated bones of the nasal cavities, instruments of the same size, but with longer shaft and without the guard, could be made. Drills upon this fundamental type can also be made by lengthening and tapering the three spiral blades to a point, and large burrs of various shapes, by increasing the number of spiral-toothed blades in definite relation to the size of the cutting instrument required.